

## SPECIFICATIONS

### Solar Tracking Radiometer System

NASA GRC intends to install a radiometer system for solar energy measurements for AM 1.5 Project. It includes continuous, automatic measurements of direct, global and diffuse solar energy. Electrical measurement Instrumentation is not included in this request.

A. Solar tracking requirements (including active Tracker, Control unit, processor, data storage method, all cables, instruction manual)

1. Alt-Azimuth or Equatorial dual (minimum) drive tracking system
2. Pointing accuracy 0.1 degrees or better
3. Weather resistant (sealed) access doors
4. Control system for year round tracking of the sun at  $41^{\circ}$  N Latitude  $\pm 5^{\circ}$
5. 120V AC source power
6. placement for at least one Direct or normal incidence solar irradiance measurement instrument
7. placement for at least two global irradiance Measurement instruments
8. placement for solar tracking sun shade, to shade one global irradiance unit from direct sunlight.
9. Return to a home position after sunset or mechanical stop , to prevent wiring damage.

B. Shade Disk Kit

1. Attach to above solar tracker to track sun.
2. Shade one global irradiance measurement instrument from direct sunlight
3. includes ventilation for two global irradiance Measurement instruments
4. 6° diameter maximum

C. Black & White Pyranometer for Diffuse Irradiance (Global – Shaded)

1. ISO Second Class/ WHO Moderate Quality
2. resolution  $<1 \text{ W/m}^2$
3. linearity:  $\pm 1\%$  or better
4. Response time (95%): 60 sec or faster
5. Spectral Range 0.285-2.8  $\mu\text{m}$  or more
6. Cosine response:  $\pm 2\%$  for  $0^{\circ}$  to  $70^{\circ}$  (Zenith Angle)  $\pm 5\%$  for  $70^{\circ}$  –  $80^{\circ}$
7. Temperature dependence curve (option)
8. Calibration certificate traceable to the World Radiation Reference

D. Precision Spectral Pyranometer for global Irradiance measurement

1. ISO Secondary Standard/ WMO High class
2. Response time (95%) 20 sec or faster
3. resolution:  $<1 \text{ W/m}^2$
4. Temperature Dependence:  $<1\%$  -20C to 40C
5. Spectral Range: 0.285-2.8  $\mu\text{m}$  or more
6. non-Linearity:  $\pm 0.5\%$  or better
7. Cosine response:  $\pm 1\%$  for  $0^\circ$  to  $70^\circ$  (Zenith Angle)  $\pm 3\%$  for  $70^\circ - 80^\circ$  or better
8. Calibration certificate traceable to the World Radiation Reference

E. Normal Incidence Pyrheliometer

1. ISO First Class Pyroheliometer/ WHO High class
2. response time (95%)  $<20\text{sec}$
3. Resolution  $<1 \text{ W/m}^2$
4. non-Linearity :  $\pm 0.5\%$  or better
5. Field of view  $<6^\circ$
6. Temperature Dependence:  $<1\%$  -20C to 40C
7. calibration certificate traceable to the World Radiation Reference and a temperature compensation curve.

F. Shipping to NASA GRC